FILE

by Gary O'Neal FWQA 1.2

Aug. 5 1970

WHZCF 1.2 V1

MERCURY RECOVERY SYSTEMS AT THE WEYERHAEUSER CORPORATION CHLOR-ALKALI PLANTS AT LONGVIEW, WASHINGTON

The following is a description of the mercury control and recovery procedures installed at the Weyerhaeuser chlor-alkali plant in Longview. The information presented here was obtained during an inspection of the plant on August 3, 1970. Those making the inspection were Jim Willmann and Gary O'Neal of FWQA and Don Provost, Gene Asselstine, and Nelson Graham of the Washington State Department of Ecology. Weyerhaeuser personnel providing information were Les Anderson, Chlorine Plant Superintendent, and Dean Werth, Plant Engineer.

Chronology

A chronology of mercury control actions is attached. The major emphasis of the Weyerhaeuser effort is to recycle the mercury bearing wastes back into the process. The initial steps to eliminate mercury discharges were taken on April 27, 1970, with the cessation of sludge discharges to the Columbia River. As the chronology indicates, numerous control procedures have been instituted since that date. Tentative plans are that installations of major mercury control equipment will be completed approximately October 1, 1970.

General Plant Description

The Weyerhaeuser facility at Longview consists of two distinct plants. Plant 1, which was constructed in the period 1956-58, has 126 Dinora chlorine cells each containing 45 flasks (3,420 lbs.) of mercury. Plant 2, constructed in 1967, has 16 larger Dinora cells each containing 120 flasks (9,100 lbs.) of mercury. The brine processing system is common to both plants.

Each plant has a separate discharge to the river and there are differences in equipment and operation. Ultimately, the two plants will have almost identical mercury recycling systems. At present, however, these systems are at different stages of implementation. Attached is a typical flow diagram for the Weyerhaeuser recycling system. In the following discussion the differences between systems at the two plants and this flow diagram will be noted.

Inlet End-box Seal Water

The inlet end box water is used as a seal to prevent loss of mercury vapor and in the process becomes contaminated with mercury. After leaving the end box the water is used as a seal in the mercury pump and then is pumped to a head tank. The head tank serves as distribution point for recycling the water back to the inlet end boxes. A portion of the water from the head tank is sent to the decomposer where it is consumed in the caustic reaction. Deionized make-up water to compensate for this loss is added to the head tank. Both plants use this system for handling inlet end box water.

Hydrogen Cooler Condensate

The hydrogen gas evolved from the caustic reaction in the decomposer carries with it mercury vapor, water vapor, and entrained water droplets contaminated with mercury. As of August 8, 1970, coolers will be operable in both plants on these waste streams. The condensed mercury is removed and placed back into the primary mercury cycle. The mercury-contaminated water condensate is pumped to the head tank for distribution to the inlet box and decomposer.

Brinks de-misters will be installed following the hydrogen coolers to further reduce mercury losses from this source. Contaminated water from the de-mister will also be sent to the head tank.

Outlet End-box Seal Water

Deionized water is used for seal water in the outlet end boxes for both plants. In Plant 1, the mercury-contaminated water leaving the system is either added directly to the depleted brine flow prior to regeneration or it is stored and used for sludge washing. In the latter case it is then added to the brine system with the dilute brine removed from the sludge in the washing process.

Outlet end-box water from Plant 2 is presently not recycled but is diverted to a non-overflow holding pond. The necessary equipment to implement recycling similar to that in Plant 1 has been ordered and should be operable early in September.

End-box Air

Even though water seals are used in all end boxes there is some loss of water vapor and mercury vapor to the air. The losses could be significant in Plant 1 which has 126 cells (252 end boxes). To reduce this loss, Weyerhaeuser plans to collect all the air from the end boxes and pass it through a condenser and a Brinks de-mister. Condensate will be recycled. At the present time, installation of a similar system for Plant 2 is not anticipated.

Cell Washings

Contaminated residues build up in both the electrolytic cell and the decomposer unit and must be periodically removed. This material is processed in a mercury washer which is designed to coalesce the mercury and facilitate its removal. The unit is not highly efficient and mercury-contaminated solid and liquid residues remain. These are discharged into the sludge holding pond.

Floor Washings, Spills, Etc.

In both plants, floor washings, leaks, spills, etc. are collected and pumped to holding ponds. Weyerhaeuser considers this as a temporary solution and plans to investigate ways of recycling this waste into the process.

Sludge from Brine System

The brine circulated through the cells becomes highly contaminated with mercury. Concentrations average about 15 ppm. After leaving the cell, the depleted brine from both plants is directed to a central salt dissolver for reconstitution. Chemicals are then added to precipitate impurities and facilitate settling. These impurities are then removed in a clarifier. The sludge contains significant amounts of mercury, both in the solid and liquid fraction. After washing to remove further brine, the sludge is pumped to a storage pond.

The ponds used to hold the sludge, and other waste streams as indicated above, are very hastily built installations. They are scooped out of sandy river deposits adjacent to the plants. Observations of changes in water marks on the sides of the ponds indicates a fairly rapid rate of seepage into the sand. Adjacent to the sludge pond there is a drainage ditch leading straight to the river. At the time of our inspection there was visible evidence of recent direct drainage through the sludge pond dike into the ditch. A sample of ditch water was collected.

Plant personnel indicated that they had done no monitoring of mercury concentrations in the ground water in the vicinity of the ponds. They said there is a natural rock dike between the ponds and the river and that chances of seepage into the river are minimal. No concrete evidence to support this position was presented.

The company is investigating methods to reduce the volume of sludge and to increase the solids content. Sludge thickening is being utilized and has resulted in an increase in solids levels from three percent to 10-12 percent. Tests on the feasibility of using vacuum filtration to remove additional contaminated water from the sludge are planned. Plant personnel indicated a willingness to begin treating this and other contaminated water streams currently being sent to the ponds. One clarifier presently used for brine treatment can be made available. Definite plans for starting this treatment have not been developed, however, due to uncertainty as to what treatment methods will be acceptable to FWQA. Studies are also underway on methods to reclaim the mercury remaining in the sludge.

Cooling Water

The depleted brine streams, after leaving the cell rooms, are passed through coolers prior to going to the salt dissolver. At Plant 1 a barometric cooler is used. The brine goes into a tank under 25 inches of vacuum, and boils. The steam, plus some mercury vapor, is passed into a second chamber and condensed by direct contact with cold water. The condensate, containing low levels of mercury contaminant, is sewered. Volume of this condensate is approximately 1 mgd.

At Plant 2 the cooling process uses a shell and tube condenser and there is no direct contact between evaporated water and cooling water. The only mercury discharge from this part of the plant is from a "stripper". According to plant personnel, discharge from this unit amounts to approximately 50 gpm with a mercury level of .01 mg/l.

Summary

The overall impression of the investigators is that Weyerhaeuser Corp. is making significant progress in reducing their mercury discharges. This progress is not, however, a result of long-term planning to tighten process controls and reduce waste discharges but is in direct response to pressures applied by the Washington State Department of Ecology and FWQA.

There are still several factors which should be evaluated. Foremost among these is the possible mercury losses from the holding ponds. Weyerhaeuser should take immediate steps to monitor mercury levels in the groundwater near the ponds. They should also be required to provide evidence that seepage from these ponds does not reach the river.

Further monitoring should be conducted by FWQA. After the control steps outlined in the chronology are implemented, an in-plant survey should be conducted to verify effectiveness of these measures and to identify other sources, if any, of mercury loss.

Mercury Recycle Systems, Weyerhaeuser Chlor-Alkali Plants, Longview, Washington